

NOM-028-SCT2/1998

**FOR THE TRANSPORT OF HAZARDOUS
MATERIALS AND WASTES**

**“SPECIAL PROVISIONS FOR HAZARDOUS MATERIALS
AND WASTES OF CLASS 3 FLAMMABLE LIQUIDS
TRANSPORTED”**

SECRETARIAT OF COMMUNICATIONS AND TRANSPORT

Official Mexican Standard NOM-028-SCT2/1998 Special Provisions for Hazardous Materials and Wastes of Class 3, Flammable Liquids Transported.

AARON DYCHTER POLTOLAREK, Undersecretary of Transport and Chairman of the National Consultative Committee for Standardization of Land Transport, based upon articles 36 parts I,XII and XXVII of the Organic Act of Federal Public Administration; 1st, 38 part II, 40 part XVI and XVII, 41, 43 and 47 part IV of the Regulations for the Federal Act on Metrology and Standardization; 5th part VI of Roads, Bridges and Federal Autotransportation Act; 10 and 20 of the Regulations for the Transport of Hazardous Materials and Wastes; 4th, 6th, part XII and 19 parts I, X and XXII of the Internal Regulation for the Secretariat of Communications and Transport as any other applicable mandates, I herewith order the publication in the Federal Register the Official Mexican Standard NOM-028-SCT2/1998 "SPECIAL PROVISIONS FOR HAZARDOUS MATERIALS AND WASTES OF CLASS 3, FLAMMABLE LIQUIDS TRANSPORTED"

C O N S I D E R I N G

That it is necessary to apply uniform methods to determine the flashpoint of materials of Class 3 flammable liquids, as well as its classification of packaging group in accordance to their flammability point, for the purpose of their transportation throughout the general means of land communication.

That having completed the procedure established on the Federal Act on Metrology and Standardization for the issuance of Official Mexican Standards, the Undersecretary of Transport, on April 14, 1999, ordered the publication in the Federal Register of the project for Official Mexican Standard PROY-NOM-028-SCT2/1998 "Special Provisions for Hazardous Materials and Wastes of Class 3 Flammable Liquids Transported" which establishes special provisions in order to determine the packing group of the hazardous substances and wastes of class 3 flammable liquids, for public consultation.

That during the term of 60 natural days as of the publication of the Project of the Official Mexican Standard, the Declaration for Regulatory Impact as referred in article 45 of the Federal Act on Metrology and Standardization, were at public disposal for its consultation.

That during the mentioned term, those interested presented their comments to the project of the referenced Standard, which were analyzed within the Sub-Committee for the Transport of Hazardous Materials of the National Consultative Committee for Standardization of Land Transport, including those comments that were reasonable within the Official Mexican Standard.

That, as a result, of the work for the application of the North American Free Trade Agreement between Mexico, United States and Canada, on chapter IX, "Measures relative to Standardization", article 905 "Use of International Standards" it is pointed out that each one of the parts will use as a base for their own measures relative to standardization, the pertinent or of imminent adoption of International Standards. As to Hazardous Materials transportation is concerned, the Recommendations on the Transport of Dangerous Goods of the United Nations, will be adopted as the fundament.

That with the previous approval of the National Consultative Committee for Standardization of Land Transport I am issuing the following:

Official mexican Standard NOM-028-SCT2/1998

Special Provisions for Hazardous Materials and Wastes of Class 3 Flammable Liquids Transported.

P R E F A C E

Participants in this Official Mexican Standard were:

SECRETARIAT OF COMMUNICATIONS AND TRANSPORT

DIRECTORATE GENERAL OF FEDERAL AUTOTRANSPORT

DIRECTORATE GENERAL OF TARIFFS, RAILROADS AND MULTIMODAL
TRANSPORT

DIRECTORATE GENERAL OF CIVIL AVIATION

DIRECTORATE GENERAL OF MERCHANT MARINE

SECRETARIAT OF THE INTERIOR

DIRECTORATE GENERAL OF CIVIL PROTECTION

NATIONAL CENTER FOR DISASTER PREVENTION

SECRETARIAT OF ENVIRONMENT, NATURAL RESOURCES AND FISHERIES

NATIONAL INSTITUTE OF ECOLOGY

SECRETARIAT OF DEFENSE

DIRECTORATE GENERAL OF FIREARMS AND EXPLOSIVES CONTROL

SECRETARIAT OF ENERGY

NUCLEAR SECURITY AND SAFEGUARDS COMMISSION

SECRETARIAT OF COMMERCE AND INDUSTRIAL DEVELOPMENT

DIRECTORATE GENERAL OF STANDARDS

SECRETARIAT OF HEALTH

DIRECTORATE GENERAL OF ENVIRONMENTAL HEALTH

DIRECTORATE GENERAL OF PROJECTS

MEXICAN NATIONAL RAILROADS

PETROLEOS NACIONALES (PEMEX)

INDUSTRIAL SAFETY, ENVIRONMENTAL PROTECTION AND ENERGY
SAVING AUDITING DEPARTMENT

NATIONAL CHAMBER OF INDUSTRY

NATIONAL CHAMBER OF CARGO AUTOTRANSPORT

NATIONAL ASSOCIATION OF PAINT AND DYES MANUFACTURERS

NATIONAL ASSOCIATION OF CHEMICAL INDUSTRY

MEXICAN ASSOCIATION OF NON DESTRUCTIVE TESTS COMPANIES

MEXICAN PETROLEUM INSTITUTE

GRUPO INTERMEX, S.A. DE C.V.

DUPONT, S.A. DE C.V.

CIBA GEIGY, S.A. DE C.V.

BAYER DE MEXICO, S.A. DE C.V.

AEROVIAS DE MEXICO, S.A. DE C.V.

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**“SPECIAL PROVISIONS FOR HAZARDOUS MATERIALS AND WASTES OF
CLASS 3 FLAMMABLE LIQUIDS TRANSPORTED”.**

1. PURPOSE.

This Official Mexican Standard has as an objective, to establish the special provisions to determine the package and packing risk group of hazardous substances and wastes of class 3 flammable liquids transported.

2. APPLICABILITY.

This Official Mexican Standard applies obligatorily to shippers, carriers and consignees of hazardous substances, materials and wastes of class 3 flammable liquids and to determine the type of package and packaging for its transportation.

3. REFERENCES.

NOM-002-SCT2/1994	LIST OF THE MOST COMMONLY TRANSPORTED HAZARDOUS SUBSTANCES AND MATERIALS.
NOM-003-SCT2/1994	CHARACTERISTICS OF THE LABELS OF PACKAGES AND PACKAGINGS DESTINED TO TRANSPORT HAZARDOUS SUBSTANCES, MATERIALS AND WASTES.
NOM-004-SCT2/1994	IDENTIFICATION SYSTEM FOR UNITS DESTINED TO THE TRANSPORT OF HAZARDOUS SUBSTANCES, MATERIALS AND WASTES.
NOM-024-SCT2/1994	SPECIFICATIONS FOR THE CONSTRUCTION AND RECONSTRUCTION, AS WELL AS TESTING METHODS FOR PACKAGES AND PACKAGINGS FOR HAZARDOUS SUBSTANCES, MATERIALS AND WASTES.

4. DEFINITIONS.

Flammable liquids: Liquids or mixtures thereof, that may contain dissolved solids in solutions or suspensions (provided that they are not included among other classes due to their dangerous characteristics) and that produce flammable vapors at temperatures of no more than 60.5° C in closed cup or no larger than 65.6° C in open cup, when being tested according to recognized methods as stated on section 5.6 of this standard.

It is not, however, considering flammable liquids to the effects of these provisions, those liquids with a flash point over 35° C which do not sustain combustion. Liquids to be transported at temperatures equal or superior to their flash point are, in any case, considered flammable liquids. Also considered so, are those substances transported or destined to be transported at elevated temperatures in liquid state that produce flammable vapors at maximum transported temperature or a lesser one.

Packages and packagings are classified in accordance to the degree of danger of the substances to be contained within, in the following groups:

Group I for very dangerous substances

Group II for medium dangerous substances

Group III for minor dangerous substances

5. GENERAL PROVISIONS.

- 5.1 This class only includes those substances whose flash point does not exceed 60.5° C in closed cup or 65.6° C in open cup, or in the case of transported substances at elevated temperatures, when flammable vapors may be produced when being transported at elevated temperatures, or below the maximum transportation temperature. Nevertheless, it should be noted that the flash point of a flammable liquid may vary if said liquid contains impurities.

Substances expressly included in this class must be considered as chemically pure.

- 5.2 In practice, however, substances or materials being transported with the name of such substances are frequently commercial products containing other substances or impurities.

Therefore, it may happen that liquids not appearing listed on the Official Mexican Standard NOM-002-SCT2/1994, because its flash point in its pure state is superior to 60.5° C in open cup, and is then offered for its transportation as commercial products whose flash point is equal or inferior to these limits. Besides, some liquids that being pure might be classified under packing group III may, in reality correspond to packing group II as commercial products, due to its contents of other substances or impurities.

- 5.3 For the reasons stated above, the List of Hazardous Substances and Materials more Commonly Transported, NOM-002-SCT2/1994, is for indicative purposes only and must be used with caution. In case of doubt, it is necessary to experimentally verify the flash point and boiling point or other necessary tests if there is not immediate availability of data. Each substance, mixture or solution must be classified upon the basis of the Standard's general criteria (e.gr.: flash point test, determination of the minimum boiling point, viscosity test, segregation test, combustibility test). Analytical methods based on confirmed data are also acceptable.
- 5.4 Liquids considered as non-combustible, for the purposes of this standard are for example: Those whose combustion is not sustained under definite test conditions; those that have already passed the adequate combustibility test in accordance with paragraph 6.4 of this standard; those having a flash point in accordance with standard ISO2592:1973 greater than 100° C or if they are miscible solutions with a water content of more than 90% by mass.
- 5.5 Table 1 must be used to classify liquids within a packing group, when exhibiting a risk due to their flammability.
- 5.5.1 In the case of liquids whose only risk is flammability, their packing group is indicated on table 1.

Table 1: Classification in groups based on flammability

Package/Packaging Group	Flash point (closed cup)	Initial boiling point
I		≤ 35° C
II	< 23° C	> 35° C
III	≥ 23° C, ≤ 60.5° C	> 35° C

- 5.5.2 In the case of liquids presenting one or several additional subsidiary risks in order to classify them correctly Table 5 must be utilized in order of risk characteristic preponderance of Official Mexican Standard NOM-002-SCT2/1994. The packaging group of the substance will correspond to the greater risk.
- 5.5.3 Viscous substances with a flash point below 23° C, must be classified for packing and packaging group III according to paragraphs 6.1 and 6.2
- 5.5.4 Substances classified as flammable liquids due to their transportation at elevated temperatures are included in package/package group III.
- 5.5.5 Viscous substances whose flash point is equal to or over 23° C and equal or lower than 60.5° C, that are not toxic or corrosive, not containing more than 20% of nitrocellulose on condition that nitrocellulose do not contain more than 12.6% of nitrogen (dry mass) and that is packed and packaged in containers with equal or less capacity than 450 liters, are not subject to these regulations for the transport of hazardous materials and wastes if:
- a) On the Solvent Separation Test (see paragraph 6.3 (c) of this Standard), the height of the upper separated layer of solvent is less than 3% of the total height and;
 - b) The flow time in the viscosity test according to paragraph 6.3 (a) of the Standard, utilizing a 6 mm jet is equal or greater than :
 - 1) 60 seconds; or
 - 2) 40 seconds if the viscous substances contain a maximum of 60% of class 3 substances.
- 5.6 The most commonly used methods to determine the flash point of substances of class 3 flammable liquids, are:
- a) Standard DIN 51755 (flash point below 65° C).
 - b) Standard DIN 51758 (flash point between 65° C and 165° C).
 - c) Standard DIN 53213 (for varnishes, laquers and similar viscous liquids with a flash point below 65° C).
 - d) ASTM D 56-93
 - e) ASTM D 3278-89

- f) ASTM D 93-90
- g) ISO 1523
- h) ISO 1516
- i) ISO 3679
- j) ISO 3680
- k) NF M 07-019
- l) NF M 07-011/NF T 030-050/ NF T 66-009
- m) NF M 07-036
- n) BS 2000 PART 34
- ñ) BS 2000 PART 170
- o) GOST 12.1.044-84

6. DETERMINATION OF THE PACKAGE AND PACKAGING GROUP IN WHICH FLAMMABLE VISCOUS SUBSTANCES WITH A FLASH POINT BELOW 23° C MUST BE INCLUDED.

- 6.1 The group in which flammable viscous substances of class 3 whose flash point is below 23° C, is determined according to the danger represented in:
- a) The viscosity, expressed in flowtime, in seconds;
 - b) The flash point in closed cup; and
 - c) The solvent separation test.
- 6.2 Criteria for the inclusion within Group III of flammable viscous liquids.

Flammable viscous liquids with a flash point below 23° C will be included in package and packaging Group III, once each and all of the following conditions are met:

- a) The separated solvent layer amounts to less than 3% when subject to the solvent separation test.
- b) The mixture does not contain more than 5% of Group I substances nor of Group II, of Division 6.1 nor of class 8, nor more of a 5% of substances of Group I, Class 3, that would require a label indicating a subsidiary risk of Division 6.1 or of Class 8.

NOTE: The mixture does not necessarily bear a subsidiary risk label of division 6.1 nor of class 8.

- c) The viscosity and flashpoint are in accordance with the following Table:

Flowtime in seconds	Diameter of jet in mm.	Flash point in °C
20 < t < 60	4	Above 17
60 < t < 100	4	Above 10
20 < t < 32	6	Above 5
32 < t < 44	6	Above -1
44 < t < 100	6	Above -5
100 < t	6	-5 or below

- d) The capacity of the receptacle used is not larger than 450 liters.

6.3 The test methods are the following:

- a) **Viscosity test:** Flowtime in seconds is determined at 23° C, utilizing an ISO (International Standard Organization) standard cup with a 4 mm jet (ISO 2431:1984). Where the flow time exceeds 100 seconds, a second test must be carried out with a ISO standard cup with a 6 mm. diameter jet.
- b) **Flash point:** Flash point in closed cup is determined according to ISO 1523:1983 method, applicable to paints and varnishes. If the flash point is too low to allow using water in the liquid bath receptacle, the test method shall be modified as follows:
 - b.1) Ethylene glycol shall be used in the liquid bath receptacle or in any other available similar receptacle.
 - b.2) If necessary, a refrigerator may be used to lower the sample and apparatus temperature to below than what is required by the method of determination of the expected flash point.

To obtain lower temperatures, the sample and the equipment must be cooled off by slowly adding solid carbon dioxide to the ethylene glycol and in the same manner cooling off the sample on another container of ethylene glycol.

b.3) For dependability on the determination of flash points, it is important not to exceed the recommended rate of temperature rise for the sample during testing is not exceeded.

Based on the volume of the bath and the amount of ethylene glycol contained by it, it may be necessary to partially insulate the liquid bath to achieve a sufficiently slow rate of temperature rise.

c) **Solvent Separation Test:** This test is performed at 23° C in a 100 ml. test tube fitted with a stopper, with a total height of around 25 cm. And of an interior uniform diameter of some 3 cm on the calibrated section. The paint is stirred to obtain a uniform consistency and is then poured in the test tube up to the 100 ml mark. The stopper is then placed in the test tube which is then placed undisturbed for 24 hours. After that period, the height of the upper separated layer is then measured, and the percentage of height of this layer is calculated percentage wise in relation with the total height of the sample.

6.4 Testing method for combustibility.

6.4.1 The method describes a procedure to determine if a substance, when heated under testing conditions, maintains combustion when is exposed to a flame.

6.4.2 Method principle: A concave hollowed-area piece of metal (test cavity) is heated to an specific temperature. A determined volume of the substance to be tested, is placed in the cavity, and its capacity to maintain combustion is observed after approaching and withdrawing the flame under specific conditions.

6.4.3 Apparatus: The combustibility tester consists of an aluminum alloy block or another metal that is corrosion resistant and with a high thermal conductivity. The block has a concave cavity and a pocket drilled to install a thermometer, a small gas jet is assembled in a swivel attached to the block.

The handle and the gas inlet are connected to the gas jet at a convenient angle, as shown on figure 1; basic dimensions are also shown. The following equipment is also required:

a) A gauge to verify that the height of the gas jet center over the upper part of the test cavity is of 2.2 mm. as indicated in figure 1;

- b) A mercury thermometer for horizontal operation, with a sensitivity of no less than 1 mm/° C or other equally sensitive equivalent device that allows readings at 0.5° C intervals. When installing the thermometer in the apparatus, the bulb must be surrounded with a thermoplastic temperature conductor compound;
- c) A hotplate with temperature regulating device. Any other devices with an adequate temperature control installations can be used to heat the metal block.
- d) A chronometer (stop watch), or another suitable timing device;
- e) A syringe with a 2 ml. capacity and with ± 0.1 ml., and
- f) A butane gas source of fuel.

6.4.4 Sampling: The sample must be representative of the substance to be tested and must be kept in a hermetic receptacle before the test due to a possible loss of its constituents, to prevent the volatility of the compounds; the sample must be minimally handled to ensure its homogeneity.

After each sample portion has been drawn, the sample receptacle must be immediately closed hermetically to ensure that none of the volatile components escapes from the receptacle; if it so happens, it is necessary to draw a new sample

Both the receptacle and its cap must be made of a compatible material to the product being tested, in order to avoid possible contamination.

6.4.5 Procedure: The determination must be made in triplicate. Caution: Do not carry out the tests on small and confined areas (such as lockers, etc.), owing to the danger of explosion.

- a) To be able to observe the behaviour of flash, flames, etc., it is important that the test apparatus is placed in an area completely free of air currents and drafts and in the absence of strong lights.
- b) Place the metal block on the hotplate or heat it by other method until reaching the desired test temperature indicated by the thermometer installed in the metal block and maintain a constant temperature with a $\pm 1^\circ$ C tolerance.

Test temperature is 60.5° C or 75° C (see paragraph h). Temperature must undergo corrections due to differences in barometric pressures over the standard atmospheric pressure (101.3 kph), by raising the test temperature at higher pressure or decreasing same at lower pressure at a rate of 1° C per each 4 kph difference. Make sure that the upper edge of the metallic block is in a perfectly horizontal position.

Use the gage to verify that the jet is situated at 2.2 mm. above the edge of the cavity, prior to starting the test.

- c) Ignite the gas jet far from the test position (in the "OFF" position, away from the test cavity), adjusting the flame size between 8 and 9 mm. high and approximately 5 mm. wide.
- d) By using the syringe, take at least 2 ml. from the sample receptacle, rapidly transferring this sample portion of 2 ml. \pm 0.1 ml. to the combustibility tester cavity and immediately start the chronometer (stop watch)
- e) After a heating period of 60 seconds, which is the time considered for the sample portion has reached its equilibrium temperature and if the sample portion has not ignited, swing the test flame over the liquid, maintaining it in that position for 15 seconds and withdraw the flame watching at all times the sample portion. The test flame must remain alight throughout the development of the test.
- f) The test must be performed in triplicate for each test. Observe and record:

f.1) If there is ignition of the sample and sustained combustion or if there is only a flash or neither happens, before the test flame approaches sample (test position)

f.2) If the sample is ignited while the test flame is approaching sample and if so happens, determine the length of time of sustained combustion after the test flame is withdrawn (off position).

- g) If interpretation of sustained combustion is not found according to paragraph 6.4.6, repeat the full procedure with new sample portions, but with a 30 second heating period.
- h) If interpretation of sustained combustion is not found according to paragraph 6.4.6, at a test temperature of 60.5° C, repeat the full procedure with new sample portions, but at a test temperature of 75° C.

6.4.6 Interpretation of observations: substance must be classified as "SUSTAINS COMBUSTION" or "DOES NOT SUSTAINS COMBUSTION". If sustains combustion must be reported either by timing or by heating temperatures, if something of the following happens with the samples:

- a) If the sample ignites and sustains combustion before approaching the test flame, or
- b) If the sample ignites at the approach of the test flame for 15 seconds and sustains combustion for more than additional 15 seconds after having withdrawn the test flame.

Intermittent flashing must not be interpreted as "SUSTAINS COMBUSTION". Normally, after 15 seconds, combustion has clearly ceased or continues; in case that there persists any doubt, it must be assumed that the substance sustains combustion.

7. BIBLIOGRAPHY.

Recommendations on the Transport of Dangerous Goods issued by the United Nations Organization, Tenth edition, New York and Geneva 1997; Manual of Test and Criteria, second revised edition, United Nations Organization, New York and Geneva, 1995.

8. HARMONIZATION WITH INTERNATIONAL STANDARDS.

This Official Mexican Standard is equivalent to the Recommendations on the Transport of Dangerous Goods of the United Nations Organization, Chapter 2.3, Model Regulations, tenth revised edition, United Nations, New York and Geneva, 1997).

9. COMPLIANCE.

Based upon provisions within the Regulations on the Land Transport of Hazardous Materials and Wastes, this Standard is obligatory.

10. ENFORCEMENT.

The Secretariat of Communications and Transport through the Directorate General of Autotransportation, is the competent authority to enforce compliance of this Official Mexican Standard.

11. SANCTIONS.

Non compliance of the provisions contained in this Official Mexican Standard, will be sanctioned according to provisions within the Regulations for the Land Transport of Hazardous Materials and Wastes and other applicable Legal Ordinances.

12. VALIDITY.

This Official Mexican Standard will be in effect after 60 days of its publication in the Official Register.

14. TRANSITORY.

This Official Mexican Standard, abrogates NOM-028-SCT2/1994, published in the Official Register on October 4, 1995.

Mexico, D.F., (No date)

**THE UNDERSECRETARY OF TRANSPORT
AND CHAIRMAN OF THE NATIONAL CONSULTATIVE
COMMITTEE OF LAND TRANSPORT STANDARIZATION**

AARON DYCHTER POLTOLAREK